

Antarctic Meteorite

NEWSLETTER

**Volume 15
Number 1**

March 1992

A periodical issued by
the Meteorite Working
Group to inform
scientists of the basic
characteristics
of specimens
recovered in the
Antarctic.

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SAMPLE REQUEST DEADLINE:
April 3, 1992 !!!!

MWG MEETS April 23-25, 1992

SAMPLE REQUEST GUIDELINES

All sample requests should be made in writing to:

Secretary, MWG
SN2/Planetary Science Branch
NASA/Johnson Space Center
Houston, TX 77058 USA.

Requests that are received by the MWG Secretary before April 3, 1992 will be reviewed at the MWG meeting on April 23-25, 1992 to be held in Houston, Texas. Requests that are received after the April 3 deadline may possibly be delayed for review until the MWG meets again in the Fall of 1992. **PLEASE SUBMIT YOUR REQUESTS ON TIME.** Questions pertaining to sample requests can be directed in writing to the above address or can be directed to the curator at (713) 483-5135 or the secretary at (713) 483-5125.

Requests for samples are welcomed from research scientists of all countries, regardless of their current state of funding for meteorite studies. Graduate student requests should be initialed or countersigned by a supervising scientist to confirm access to facilities for analysis. All sample requests will be reviewed by the Meteorite Working Group (MWG), a peer-review committee which meets twice a year to guide the collection, curation, allocation, and distribution of the U. S. collection of Antarctic meteorites. Issuance of samples does not imply a commitment by any

agency to fund the proposed research. Requests for financial support must be submitted separately to the appropriate funding agencies. As a matter of policy, U.S. Antarctic meteorites are the property of the National Science Foundation and all allocations are subject to recall.

Each request should accurately refer to meteorite samples by their respective identification numbers and should provide detailed scientific justification for proposed research. Specific requirements for samples, such as sizes or weights, particular locations (if applicable) within individual specimens, or special handling or shipping procedures should be explained in each request. Requests for thin sections which will be used in destructive procedures such as ion probe, etch or even repolishing, must be stated explicitly. Consortium requests should be initialed or countersigned by a member of each group in the consortium. All necessary information should probably be condensable into a one- or two-page letter, although informative attachments (reprints of publication that explain rationale, flow diagrams for analyses, etc.) are welcome.

Samples can be requested from any meteorite that has been made available through announcement in any issue of the Antarctic Meteorite Newsletter (beginning with 1 (1) in June, 1978). Many of the meteorites have also been described in four Smithsonian Contr. Earth Sci.: Nos. 23, 24, 26, and 28.

New Meteorites

This newsletter presents classifications of 267 meteorites from the 1986-1990 collections. Descriptions are given for 27 meteorites of special petrologic type. These include 3 achondrites, 4 enstatite chondrites, numerous carbonaceous chondrites, 7 unequilibrated ordinary chondrites, and four unusual equilibrated chondrites. The most noteworthy of the whole group is achondrite LEW88663 which has chondritic mineral compositions.

1991-1992 Field Collection Season

The ANSMET collection team has returned from a successful Antarctic field season in the Thiel Mountains-Pecora Escarpment area. They traversed about 2000 km by snow mobile and visited 15 different ice fields. They also conducted reconnaissance via Twin Otter of the Pautexant and Wisconsin Ranges. This is the first year that our fearless leader Bill Cassidy waited in warmth and comfort for reports from the team. While Bill remains PI on the ANSMET grant and is in charge of organization, Ralph Harvey (U TN) is CoPI and field team leader. The 600 new meteorites, including many interesting specimens, will be sent to JSC in April. The first classifications of these meteorite will appear in the fall newsletter.

Staff Changes and Reorganization at JSC

Planetary Materials and Lunar Sample Curator John Dietrich retired at the end of 1991 after 25 years service at JSC, the last ten in lunar curation. We wish John many happy days in the Texas hill country. Jim Gooding has replaced John as head curator and promises to keep up the tradition of excellence in planetary materials curation and to look toward the future of curation of new samples from the Moon and Mars. Jim has previously been responsible for curation of cosmic dust and Antarctic meteorites and has worked in Mars mission planning. Other curatorial staff assignments remain unchanged. Marilyn Lindstrom continues as Antarctic meteorite curator and Robbie Score continues as Meteorite Working Group Secretary. The Office of the Curator (Jim Gooding, chief) is now separate from the Planetary Science Branch (Gordon McKay, chief). The curator's office retains the same mailing address, mail code SN2, while the science branch has mail code SN4. We're all still here in Building 31 and ready to help you with curation or debate planetary science.

From 1986-1990 Collections

Pages 5-18 contain preliminary descriptions and classifications of meteorites that were completed since publication of issue 14(2) (September 1991). All specimens of special petrologic type (carbonaceous chondrite, unequilibrated ordinary chondrite, achondrite, etc.) are represented by separate descriptions. However, some specimens of non-special petrologic type are listed only as single line entries in Table 1. For convenience, new specimens of special petrologic type are also recast in Table 2.

Macroscopic descriptions of stony meteorites were performed at NASA/JSC. These descriptions summarize hand-specimen features observed during initial examination. Classification is based on microscopic petrography and reconnaissance-level electron microprobe analyses using polished sections prepared from a small chip of each meteorite. For each stony meteorite the sample number assigned to

the preliminary examination section is included. In some cases, however, a single microscopic description was based on thin sections of several specimens believed to be members of a single fall.

Meteorite descriptions contained in this issue were contributed by the following individuals:

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Antarctic Meteorite Locations

- ALH — Allan Hills
- BOW — Bowden Neve
- BTN — Bates Nunataks
- DOM — Dominion Range
- DRP — Derrick Peak
- EET — Elephant Moraine
- GEO — Geologists Range
- GRO — Grosvenor Mountains
- HOW — Mt. Howe
- ILD — Inland Forts
- LEW — Lewis Cliff
- MAC — MacAlpine Hills
- MBR — Mount Baldr
- MET — Meteorite Hills
- MIL — Miller Range
- OTT — Outpost Nunatak
- QUE — Queen Alexandra Range
- PCA — Pecora Escarpment
- PGP — Purgatory Peak
- RKP — Reckling Peak
- TIL — Thiel Mountains
- TYR — Taylor Glacier
- WIS — Wisconsin Range

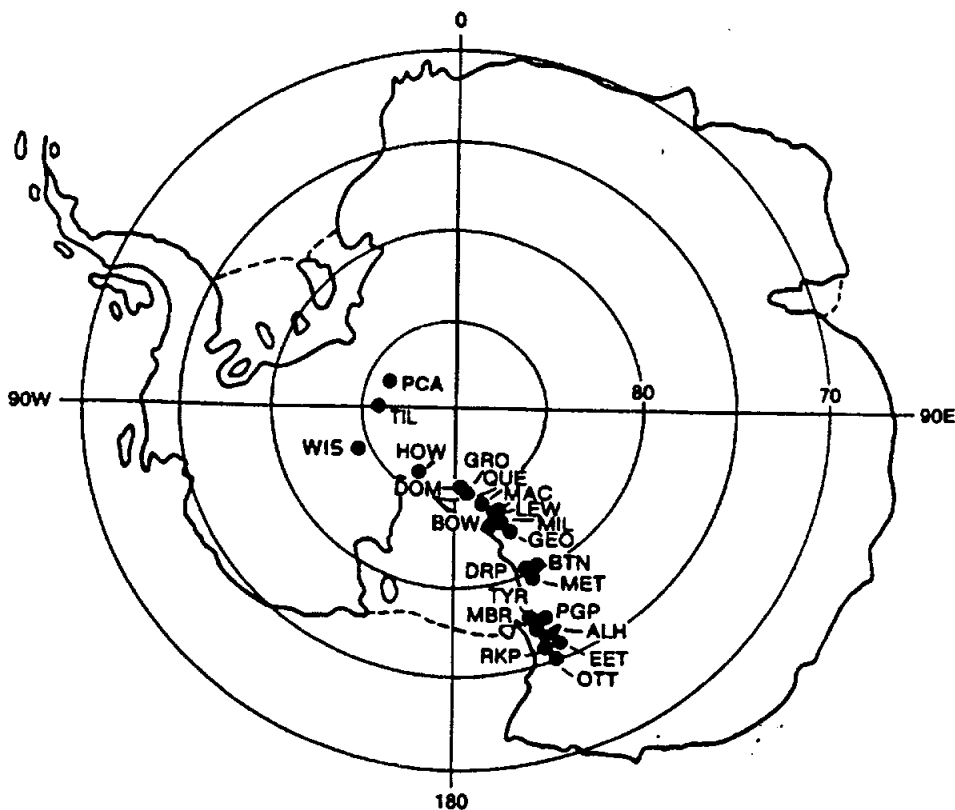


TABLE 1

List of Newly Classified Antarctic Meteorites **

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---------------|------------|----------------|------------|------------|------|--------|
| LEW 87115 | 30.4 | H-6 CHONDRITE | C | B | 17 | 15 |
| LEW 86146 | 2.9 | H-6 CHONDRITE | C | B/C | 19 | 17 |
| LEW 86277 | 25.4 | H-5 CHONDRITE | C | A/B | 18 | 16 |
| LEW 86278 | 1.4 | H-5 CHONDRITE | C | A | 17 | 15 |
| LEW 86279 | 12.8 | H-5 CHONDRITE | Ce | B | 19 | 17 |
| LEW 86280 | 10.5 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 86283 | 13.6 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 86284 | 4.0 | H-5 CHONDRITE | C | A | 19 | 17 |
| LEW 86285 | 4.2 | H-5 CHONDRITE | C | A | 19 | 17 |
| LEW 86290 | 9.6 | H-4 CHONDRITE | C | A | 19 | 16-20 |
| LEW 86291 | 14.9 | H-6 CHONDRITE | C | B | 18 | 16 |
| LEW 86293 | 1.3 | H-5 CHONDRITE | C | A | 19 | 17 |
| LEW 86294 | 2.0 | H-5 CHONDRITE | C | A | 19 | 17 |
| LEW 86296 | 28.5 | H-5 CHONDRITE | Ce | B | 19 | 17 |
| LEW 86297 | 3.0 | L-6 CHONDRITE | C | A | 26 | 21 |
| LEW 86298 | 7.2 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 86299 | 25.1 | H-5 CHONDRITE | C | A | 19 | 17 |
| LEW 86300 | 9.0 | H-5 CHONDRITE | C | A | 19 | 16 |
| LEW 86301 | 5.1 | H-5 CHONDRITE | C | A | 19 | 16 |
| LEW 86303 | 17.6 | H-4 CHONDRITE | Ce | A | 18 | 17-19 |
| LEW 86304 | 4.2 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 86306 | .6 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 86308 | 3.1 | H-4 CHONDRITE | B/C | A | 19 | 16 |
| LEW 86310 | 7.6 | H-5 CHONDRITE | C | A | 19 | 16 |
| LEW 86313 | 3.8 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 86315 | 22.7 | H-5 CHONDRITE | C | B | 18 | 16 |
| LEW 86316 | 4.3 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 87054 | 5.8 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 87057 | .4 | E-3 CHONDRITE | C | A/B | 0.3 | 0.1-18 |
| LEW 87059 | 13.2 | H-5 CHONDRITE | B/C | A | 18 | 16 |
| LEW 87064 | 6.7 | H-3 CHONDRITE | B/C | A | 2-20 | 3-21 |
| LEW 87065 | 6.1 | L-5 CHONDRITE | B | A | 23 | 19 |
| LEW 87068 | 30.1 | H-6 CHONDRITE | B/C | B | 17 | 15 |
| LEW 87073 | 13.3 | H-5 CHONDRITE | B/C | A | 18 | 16 |
| LEW 87074 | 12.8 | H-5 CHONDRITE | C | A | 17 | 15 |
| LEW 87075 | 13.7 | H-5 CHONDRITE | B/C | A | 18 | 16 |
| LEW 87077 | 8.4 | H-5 CHONDRITE | B/C | A | 17 | 15 |
| LEW 87078 | 6.2 | H-6 CHONDRITE | C | A | 17 | 15 |
| LEW 87079 | 5.2 | H-5 CHONDRITE | B/C | A | 17 | 15 |
| LEW 87080 | 10.6 | H-5 CHONDRITE | B/C | A | 17 | 15 |
| LEW 87081 | 24.3 | H-5 CHONDRITE | B | A | 17 | 15 |
| LEW 87082 | 14.3 | H-5 CHONDRITE | B/C | A | 17 | 15 |
| LEW 87084 | 8.5 | H-5 CHONDRITE | B/C | A | 19 | 17 |
| LEW 87085 | 9.3 | H-5 CHONDRITE | B/C | A | 18 | 16 |
| LEW 87086 | 8.0 | H-5 CHONDRITE | B/C | A | 18 | 16 |
| LEW 87087 | 23.0 | H-5 CHONDRITE | B/C | A | 18 | 16 |
| LEW 87088 | 12.7 | H-4 CHONDRITE | B/C | A | 19 | 7-18 |

~Classified by using refractive indices.

#Reclassified

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---------------|------------|----------------|------------|------------|-------|-------|
| LEW 87089 | 6.8 | H-5 CHONDRITE | B/C | A | 19 | 16 |
| LEW 87093 | 7.0 | L-3 CHONDRITE | C | A | 11-21 | 4-30 |
| LEW 87096 | 2.6 | H-6 CHONDRITE | B/C | A | 19 | 17 |
| LEW 87097 | 4.3 | H-5 CHONDRITE | C | A | 19 | 17 |
| LEW 87098 | 11.6 | H-5 CHONDRITE | B/C | A | 18 | 16 |
| LEW 87099 | 2.4 | H-5 CHONDRITE | B/C | A | 17 | 15 |
| LEW 87100 | .6 | H-6 CHONDRITE | B/C | A | 19 | 17 |
| LEW 87108 | 7.3 | H-5 CHONDRITE | B/C | A | 17 | 15 |
| LEW 87110 | 12.3 | H-5 CHONDRITE | B/C | A | 18 | 16 |
| LEW 87112 | 8.0 | L-5 CHONDRITE | B | A | 23 | 19 |
| LEW 87116 | 6.6 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 87117 | 6.7 | H-6 CHONDRITE | B/C | A | 17 | 15 |
| LEW 87121 | 3.8 | H-5 CHONDRITE | B/C | A | 17 | 15 |
| LEW 87124 | 3.7 | H-6 CHONDRITE | B/C | A | 17 | 15 |
| LEW 87133 | 2.4 | L-4 CHONDRITE | B/C | A | 23 | 15-23 |
| LEW 87134 | 9.6 | H-6 CHONDRITE | C | A | 18 | 16 |
| LEW 87138 | 4.9 | H-6 CHONDRITE | C | A | 18 | 16 |
| LEW 87139 | 2.4 | H-5 CHONDRITE | C | A | 17 | 15 |
| LEW 87141 | 7.9 | H-6 CHONDRITE | B/C | A | 17 | 15 |
| LEW 87147 | 5.7 | L-4 CHONDRITE | B | A | 23 | 13-24 |
| LEW 87156 | .5 | L-5 CHONDRITE | C | A | 24 | 20 |
| LEW 87160 | .6 | H-5 CHONDRITE | B/C | A | 18 | 16 |
| LEW 87163 | .3 | H-5 CHONDRITE | B/C | A | 17 | 15 |
| LEW 87164 | .7 | L-6 CHONDRITE | B | A | 23 | 19 |
| LEW 87212 | 7.7 | H-6 CHONDRITE | B/C | A | 18 | 16 |
| LEW 87237 | 1.9 | E-3 CHONDRITE | B/C | B | - | 0-16 |
| LEW 87251 | .7 | LL-6 CHONDRITE | B | A | 29 | 23 |
| LEW 87256 | 6.6 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 87265 | 9.4 | H-6 CHONDRITE | Ce | B | 19 | 16 |
| LEW 87266 | 5.0 | H-6 CHONDRITE | B/Ce | A | 18 | 16 |
| LEW 87272 | 3.6 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 87275 | 7.7 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 87278 | 31.4 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 87280 | 2.6 | H-5 CHONDRITE | B/C | A | 19 | 17 |
| LEW 87285 | .5 | E-3 CHONDRITE | A | - | 0-16 | |
| LEW 87286 | 3.9 | H-5 CHONDRITE | B/C | A | 17 | 15 |
| LEW 87288 | 8.8 | H-5 CHONDRITE | B/C | A | 18 | 16 |
| LEW 87904 | 8.8 | L-6 CHONDRITE | | 23 | 20 | |
| LEW 88130 | 4.9 | H-5 CHONDRITE | B/C | A | 19 | 16 |
| LEW 88132 | 7.1 | H-5 CHONDRITE | B/C | A | 17 | 15 |
| LEW 88133 | 3.5 | L-5 CHONDRITE | C | A | 23 | 19 |
| LEW 88138 | 6.2 | H-5 CHONDRITE | B/C | A | 19 | 17 |
| LEW 88141 | 4.9 | H-6 CHONDRITE | B/C | A | 18 | 16 |
| LEW 88142 | 6.6 | H-6 CHONDRITE | B/C | A | 18 | 16 |
| LEW 88421 | 11.9 | H-5 CHONDRITE | C | A | 17 | 15 |
| LEW 88440 | 19.0 | H-5 CHONDRITE | C | A | 19 | 16 |
| LEW 88441 | 11.9 | H-5 CHONDRITE | C | A | 17 | 15 |
| LEW 88443 | 10.7 | H-5 CHONDRITE | C | A | 17 | 15 |
| LEW 88444 | 12.9 | H-6 CHONDRITE | C | A | 18 | 16 |
| LEW 88461 | 11.2 | H-6 CHONDRITE | C | A | 19 | 17 |
| LEW 88463 | 15.3 | H-6 CHONDRITE | C | A | 19 | 17 |
| LEW 88478 | 14.5 | H-5 CHONDRITE | Ce | A | 19 | 16 |
| LEW 88486 | 11.1 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88490 | 19.4 | H-5 CHONDRITE | C | A/B | 18 | 16 |
| LEW 88500 | 16.0 | H-3 CHONDRITE | C | B | 1-20 | 7-18 |

~Classified by using refractive indices.

#Reclassified

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---------------|------------|----------------|------------|------------|------|-------|
| LEW 88504 | 13.5 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88505 | 10.6 | H-5 CHONDRITE | B/C | A | 18 | 16 |
| LEW 88506 | 26.2 | H-6 CHONDRITE | C | C | 18 | 16 |
| LEW 88521 | 25.3 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88529 | 14.4 | L-6 CHONDRITE | C | A | 25 | 21 |
| LEW 88532 | 10.7 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88535 | 9.2 | H-5 CHONDRITE | B/C | A | 17 | 15 |
| LEW 88540 | 11.1 | H-6 CHONDRITE | C | C | 18 | 16 |
| LEW 88547 | 15.1 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88548 | 13.8 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88564 | 6.5 | LL-6 CHONDRITE | C | A | 30 | 24 |
| LEW 88571 | 2.7 | H-5 CHONDRITE | C | A | 17 | 15 |
| LEW 88572 | 10.1 | L-6 CHONDRITE | B/C | A | 24 | 21 |
| LEW 88574 | 13.7 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88586 | 6.4 | LL-6 CHONDRITE | B/C | C | 30 | 24 |
| LEW 88588 | 10.0 | H-5 CHONDRITE | | 18 | 16 | |
| LEW 88589 | 11.0 | LL-6 CHONDRITE | C | A | 28 | 23 |
| LEW 88590 | 11.8 | L-4 CHONDRITE | B/C | A | 23 | 18-21 |
| LEW 88593 | 4.3 | L-6 CHONDRITE | C | A | 25 | 21 |
| LEW 88601 | 10.6 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88606 | 2.7 | LL-6 CHONDRITE | B/C | A | 30 | 24 |
| LEW 88616 | 14.7 | H-5 CHONDRITE | C | C | 19 | 17 |
| LEW 88618 | 13.0 | H-6 CHONDRITE | Ce | A | 18 | 16 |
| LEW 88621 | 7.5 | L-3 CHONDRITE | C | A | 7-20 | 3-25 |
| LEW 88623 | 13.6 | H-5 CHONDRITE | B/C | A | 19 | 16 |
| LEW 88624 | 11.7 | H-5 CHONDRITE | C | A | 17 | 15 |
| LEW 88625 | 2.8 | L-4 CHONDRITE | B/C | A | 22 | 16-19 |
| LEW 88635 | 18.7 | H-5 CHONDRITE | C | A | 19 | 16 |
| LEW 88639 | 19.3 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88642 | 6.9 | H-5 CHONDRITE | C | A | 17 | 15 |
| LEW 88643 | 11.6 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88646 | 16.9 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88647 | 20.1 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88662 | 12.9 | H-6 CHONDRITE | C | A | 17 | 15 |
| LEW 88663 | 14.5 | ACHONDRITE (?) | C | A | 24 | 20 |
| LEW 88670 | 18.8 | L-6 CHONDRITE | C | A | 24 | 21 |
| LEW 88671 | 23.6 | H-6 CHONDRITE | C | A | 17 | 15 |
| LEW 88678 | 27.2 | H-6 CHONDRITE | C | B | 17 | 15 |
| LEW 88679 | 7.9 | DIOGENITE | B/C | A | 30 | 26 |
| LEW 88682 | 10.9 | H-4 CHONDRITE | C | A | 18 | 16 |
| LEW 88686 | 14.7 | H-6 CHONDRITE | C | A/B | 18 | 16 |
| LEW 88689 | 20.4 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88690 | 11.4 | H-6 CHONDRITE | C | C | 18 | 16 |
| LEW 88691 | 15.0 | H-4 CHONDRITE | C | A | 18 | 8-15 |
| LEW 88693 | 16.2 | H-5 CHONDRITE | B/C | A | 18 | 16 |
| LEW 88694 | 11.2 | H-4 CHONDRITE | C | A | 18 | 9-14 |
| LEW 88696 | 6.0 | L-3 CHONDRITE | B/C | A | 5-19 | 6-19 |
| LEW 88700 | 13.4 | LL-6 CHONDRITE | B/C | A | 30 | 25 |
| LEW 88703 | 9.9 | L-5 CHONDRITE | B/C | A | 23 | 20 |
| LEW 88704 | 18.3 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88706 | 10.2 | L-5 CHONDRITE | C | A | 23 | 19 |
| LEW 88707 | 10.1 | L-5 CHONDRITE | C | A | 25 | 21 |
| LEW 88708 | 12.4 | H-5 CHONDRITE | B/C | A | 18 | 16 |
| LEW 88709 | 16.4 | H-5 CHONDRITE | C | C | 18 | 16 |
| LEW 88712 | 22.9 | H-6 CHONDRITE | C | A | 17 | 15 |
| LEW 88714 | 22.6 | E-6 CHONDRITE | C | A | | 1-6 |

~Classified by using refractive indices.

#Reclassified

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---------------|------------|-----------------|------------|------------|------|-------|
| LEW 88719 | 10.9 | H-5 CHONDRITE | C | A | 19 | 17 |
| LEW 88729 | 10.1 | L-5 CHONDRITE | B/C | A | 23 | 20 |
| LEW 88737 | 10.2 | L-6 CHONDRITE | C | A | 24 | 21 |
| LEW 88743 | 42.7 | H-6 CHONDRITE | Ce | A | 17 | 15 |
| LEW 88745 | 18.3 | H-6 CHONDRITE | C | A | 19 | 17 |
| LEW 88748 | 11.9 | L-4 CHONDRITE | Ce | A | 23 | 20 |
| LEW 88752 | 18.7 | H-4 CHONDRITE | A/B | C | 19 | 13-18 |
| LEW 88756 | 28.1 | H-5 CHONDRITE | Ce | A | 18 | 16 |
| LEW 88758 | 5.0 | LL-3 CHONDRITE | C | A | 2-32 | 2-27 |
| LEW 88762 | 18.8 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88767 | 16.3 | H-5 CHONDRITE | C | A | 18 | 16 |
| LEW 88768 | 11.6 | H-6 CHONDRITE | C | A | 19 | 16 |
| LEW 88770 | 16.4 | L-5 CHONDRITE | B/C | A | 24 | 20 |
| LEW 88773 | 14.1 | L-6 CHONDRITE | C | A | 24 | 20 |
| LEW 88775 | 44.3 | H-4 CHONDRITE | C | A | 19 | 14-19 |
| LEW 88777 | 10.7 | H-4 CHONDRITE | B/C | A | 18 | 9-16 |
| LEW 88781 | 57.5 | L-6 CHONDRITE | B/C | A | 24 | 20 |
| LEW 88783 | 9.8 | LL-3 CHONDRITE | Ce | A | 7-34 | 1-18 |
| ALH 90407 | .6 | CARBONACEOUS C2 | B | A | 1-31 | |
| EET 90001 | 53.2 | CARBONACEOUS C4 | Be | A | 29 | |
| EET 90002 | 28.0 | CARBONACEOUS C4 | Be | A | 29 | |
| EET 90003 | 30.8 | CARBONACEOUS C4 | Be | A | 29 | |
| EET 90005~ | 42.3 | CARBONACEOUS C4 | Be | A | | |
| EET 90006~ | 23.9 | CARBONACEOUS C4 | Be | A | | |
| EET 90008~ | 40.0 | CARBONACEOUS C4 | Be | A | | |
| EET 90009~ | 30.1 | CARBONACEOUS C4 | Be | A | | |
| EET 90010~ | 10.0 | CARBONACEOUS C4 | Be | A/B | | |
| EET 90013~ | 36.3 | CARBONACEOUS C4 | Be | A | | |
| EET 90014~ | 20.8 | CARBONACEOUS C4 | Be | A/B | | |
| EET 90016~ | 45.1 | CARBONACEOUS C4 | Be | A | | |
| EET 90017~ | 15.6 | CARBONACEOUS C4 | Be | A | | |
| EET 90019 | 21.5 | UREILITE | B/C | A | 11 | 10 |
| EET 90021 | 19.6 | CARBONACEOUS C2 | A/B | A | 1-28 | 1-3 |
| EET 90023~ | 31.5 | CARBONACEOUS C4 | Be | A | | |
| EET 90025 | 45.8 | CARBONACEOUS C4 | Be | A | 29 | |
| EET 90026 | 61.5 | CARBONACEOUS C4 | Ae | A | 29 | |
| EET 90027~ | 6.2 | CARBONACEOUS C4 | Be | A | | |
| EET 90028~ | 31.3 | CARBONACEOUS C4 | Be | A | | |
| EET 90035~ | 1.3 | CARBONACEOUS C4 | Be | A | | |
| EET 90036~ | 21.2 | CARBONACEOUS C4 | Be | A | | |
| EET 90037~ | 6.0 | L-6 CHONDRITE | B | A | | |
| EET 90038~ | 5.5 | CARBONACEOUS C4 | B | A | | |
| EET 90039~ | 5.8 | CARBONACEOUS C4 | B | A | | |
| EET 90040 | 13.1 | CARBONACEOUS C4 | Be | A | 31 | |
| EET 90041 | 2.2 | CARBONACEOUS C4 | B | A | 31 | |
| EET 90042 | 14.2 | CARBONACEOUS C4 | B | A | 28 | |
| EET 90043 | 12.5 | CARBONACEOUS C2 | B | A | 1-49 | 1-9 |
| EET 90044 | 11.5 | CARBONACEOUS C4 | B | A | 28 | |
| EET 90045 | 6.6 | CARBONACEOUS C4 | B | A | 29 | |
| EET 90046 | 5.3 | CARBONACEOUS C4 | Be | A | 30 | |
| EET 90047 | 1.2 | CARBONACEOUS C2 | B | A | 1-11 | |
| EET 90048 | 12.4 | CARBONACEOUS C4 | Be | A | 31 | |
| EET 90049 | 18.0 | CARBONACEOUS C4 | B | A | 30 | |
| EET 90050 | 4.1 | CARBONACEOUS C4 | B | A | 30 | |
| EET 90052 | 10.7 | CARBONACEOUS C4 | Be | A | 30 | |

~Classified by using refractive indices.

#Reclassified

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---------------|------------|----------------|------------|------------|------|------|
| QUE 90201# | 1282.5 | L-5 CHONDRITE | A/B | A | 26 | 22 |
| QUE 90202# | 440.0 | L-5 CHONDRITE | A | A | 26 | 22 |
| QUE 90203 | 1132.1 | H-6 CHONDRITE | A | C | 18 | 16 |
| QUE 90204 | 334.6 | H-6 CHONDRITE | B/C | C | 18 | 16 |
| QUE 90205 | 458.5 | L-5 CHONDRITE | A/B | A | 26 | 21 |
| QUE 90206 | 548.9 | L-5 CHONDRITE | A/B | B/C | 26 | 21 |
| QUE 90207 | 366.9 | L-5 CHONDRITE | A/B | A | 26 | 21 |
| QUE 90208 | 811.6 | L-5 CHONDRITE | A/B | A | 26 | 21 |
| QUE 90209 | 560.4 | L-5 CHONDRITE | B | A | 27 | 22 |
| QUE 90210 | 316.1 | L-5 CHONDRITE | A/B | A | 26 | 21 |
| QUE 90211 | 436.3 | L-5 CHONDRITE | A/Be | A | 26 | 22 |
| QUE 90212 | 607.4 | L-5 CHONDRITE | B | A | 25 | 21 |
| QUE 90213 | 389.0 | L-5 CHONDRITE | A/B | A | 26 | 21 |
| QUE 90214 | 571.3 | L-5 CHONDRITE | A/B | A | 26 | 22 |
| QUE 90215 | 358.9 | L-5 CHONDRITE | A/B | A/B | 27 | 23 |
| QUE 90216 | 359.3 | L-5 CHONDRITE | A/B | A | 26 | 22 |
| QUE 90217 | 327.7 | L-5 CHONDRITE | A/B | A | 26 | 22 |
| QUE 90218 | 926.5 | L-5 CHONDRITE | A/B | A | 26 | 22 |
| QUE 90219 | 316.0 | L-5 CHONDRITE | A/B | A | 26 | 22 |
| QUE 90221 | 432.7 | L-5 CHONDRITE | B/C | B/C | 26 | 22 |
| QUE 90222~ | 476.8 | L-6 CHONDRITE | A/B | A | | |
| QUE 90224 | 245.8 | L-5 CHONDRITE | A/B | A/B | 27 | 23 |
| QUE 90225 | 325.5 | L-5 CHONDRITE | A/B | A | 27 | 22 |
| QUE 90226 | 302.0 | L-5 CHONDRITE | B/C | A | 27 | 22 |
| QUE 90227~ | 200.1 | L-5 CHONDRITE | A/B | A | | |
| QUE 90228~ | 244.7 | H-6 CHONDRITE | B/C | A | | |
| QUE 90229~ | 307.6 | L-5 CHONDRITE | A/B | A | | |
| QUE 90230~ | 236.3 | L-5 CHONDRITE | B | B | | |
| QUE 90231~ | 169.2 | L-5 CHONDRITE | B | A | | |
| QUE 90232~ | 181.9 | L-5 CHONDRITE | B | A | | |
| QUE 90233~ | 157.4 | L-5 CHONDRITE | B | A | | |
| QUE 90234~ | 333.2 | L-5 CHONDRITE | B | B/C | | |
| QUE 90235~ | 178.8 | L-5 CHONDRITE | B | A | | |
| QUE 90236~ | 187.1 | L-5 CHONDRITE | B | A | | |
| QUE 90237~ | 301.8 | L-5 CHONDRITE | B | A | | |
| QUE 90238~ | 205.1 | L-5 CHONDRITE | B | A | | |
| QUE 90239~ | 168.2 | L-5 CHONDRITE | B/C | C | | |
| QUE 90240~ | 115.8 | L-5 CHONDRITE | B | A | | |
| QUE 90241~ | 69.3 | L-5 CHONDRITE | A/B | A | | |
| QUE 90242~ | 212.5 | L-5 CHONDRITE | B | A | | |
| QUE 90243~ | 245.9 | L-5 CHONDRITE | A/B | A | | |
| QUE 90244~ | 152.4 | L-5 CHONDRITE | B | A/B | | |
| QUE 90245~ | 117.6 | L-5 CHONDRITE | A/B | A | | |
| QUE 90246~ | 103.1 | L-5 CHONDRITE | A/B | A | | |
| QUE 90247~ | 131.2 | L-5 CHONDRITE | A/B | A | | |
| QUE 90248~ | 153.9 | L-5 CHONDRITE | A/B | B | | |
| QUE 90249~ | 150.7 | L-5 CHONDRITE | A/B | A | | |
| WIS 90300 | 338.1 | L-5 CHONDRITE | B/C | A | 26 | 21 |
| WIS 90301~ | 805.9 | L-6 CHONDRITE | A/B | A | | |
| WIS 90302 | 3864.6 | H-5 CHONDRITE | B | B | 18 | 16 |
| WIS 90303 | 196.4 | L-5 CHONDRITE | A | B/C | 25 | 21 |

~Classified by using refractive indices.

#Reclassified

TABLE 2

Newly Classified Specimens Listed By Type **

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|--------------------------------|------------|-----------------|------------|------------|------|------|
| Achondrites | | | | | | |
| LEW 88663 | 14.5 | ACHONDRITE (?) | C | A | 24 | 20 |
| LEW 88679 | 7.9 | DIOGENITE | B/C | A | 30 | 26 |
| EET 90019 | 21.5 | UREILITE | B/C | A | 11 | 10 |
| Carbonaceous Chondrites | | | | | | |
| ALH 90407 | .6 | CARBONACEOUS C2 | B | A | 1-31 | |
| EET 90021 | 19.6 | CARBONACEOUS C2 | A/B | A | 1-28 | 1-3 |
| EET 90043 | 12.5 | CARBONACEOUS C2 | B | A | 1-49 | 1-9 |
| EET 90047 | 1.2 | CARBONACEOUS C2 | B | A | 1-11 | |
| EET 90001 | 53.2 | CARBONACEOUS C4 | Be | A | 29 | |
| EET 90002 | 28.0 | CARBONACEOUS C4 | Be | A | 29 | |
| EET 90003 | 30.8 | CARBONACEOUS C4 | Be | A | 29 | |
| EET 90005~ | 42.3 | CARBONACEOUS C4 | Be | A | | |
| EET 90006~ | 23.9 | CARBONACEOUS C4 | Be | A | | |
| EET 90008~ | 40.0 | CARBONACEOUS C4 | Be | A | | |
| EET 90009~ | 30.1 | CARBONACEOUS C4 | Be | A | | |
| EET 90010~ | 10.0 | CARBONACEOUS C4 | Be | A/B | | |
| EET 90013~ | 36.3 | CARBONACEOUS C4 | Be | A | | |
| EET 90014~ | 20.8 | CARBONACEOUS C4 | Be | A/B | | |
| EET 90016~ | 45.1 | CARBONACEOUS C4 | Be | A | | |
| EET 90017~ | 15.6 | CARBONACEOUS C4 | Be | A | | |
| EET 90023~ | 31.5 | CARBONACEOUS C4 | Be | A | | |
| EET 90025 | 45.8 | CARBONACEOUS C4 | Be | A | 29 | |
| EET 90026 | 61.5 | CARBONACEOUS C4 | Ae | A | 29 | |
| EET 90027~ | 6.2 | CARBONACEOUS C4 | Be | A | | |
| EET 90028~ | 31.3 | CARBONACEOUS C4 | Be | A | | |
| EET 90035~ | 1.3 | CARBONACEOUS C4 | Be | A | | |
| EET 90036~ | 21.2 | CARBONACEOUS C4 | Be | A | | |
| EET 90038~ | 5.5 | CARBONACEOUS C4 | B | A | | |
| EET 90039~ | 5.8 | CARBONACEOUS C4 | B | A | | |
| EET 90040 | 13.1 | CARBONACEOUS C4 | Be | A | 31 | |
| EET 90041 | 2.2 | CARBONACEOUS C4 | B | A | 31 | |
| EET 90042 | 14.2 | CARBONACEOUS C4 | B | A | 28 | |
| EET 90044 | 11.5 | CARBONACEOUS C4 | B | A | 28 | |
| EET 90045 | 6.6 | CARBONACEOUS C4 | B | A | 29 | |
| EET 90046 | 5.3 | CARBONACEOUS C4 | Be | A | 30 | |
| EET 90048 | 12.4 | CARBONACEOUS C4 | Be | A | 31 | |
| EET 90049 | 18.0 | CARBONACEOUS C4 | B | A | 30 | |
| EET 90050 | 4.1 | CARBONACEOUS C4 | B | A | 30 | |
| EET 90052 | 10.7 | CARBONACEOUS C4 | Be | A | 30 | |

~Classified by using refractive indices.

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---------------|------------|----------------|------------|------------|------|------|
|---------------|------------|----------------|------------|------------|------|------|

Chondrites - Type 3

| | | | | | | |
|-----------|------|----------------|-----|---|-------|------|
| LEW 87064 | 6.7 | H-3 CHONDRITE | B/C | A | 2-20 | 3-21 |
| LEW 88500 | 16.0 | H-3 CHONDRITE | C | B | 1-20 | 7-18 |
| LEW 87093 | 7.0 | L-3 CHONDRITE | C | A | 11-21 | 4-30 |
| LEW 88621 | 7.5 | L-3 CHONDRITE | C | A | 7-20 | 3-25 |
| LEW 88696 | 6.0 | L-3 CHONDRITE | B/C | A | 5-19 | 6-19 |
| LEW 88758 | 5.0 | LL-3 CHONDRITE | C | A | 2-32 | 2-27 |
| LEW 88783 | 9.8 | LL-3 CHONDRITE | Ce | A | 7-34 | 1-18 |

E Chondrites

| | | | | | | |
|-----------|------|---------------|-----|-----|------|--------|
| LEW 87057 | .4 | E-3 CHONDRITE | C | A/B | 0.3 | 0.1-18 |
| LEW 87237 | 1.9 | E-3 CHONDRITE | B/C | B | - | 0-16 |
| LEW 87285 | .5 | E-3 CHONDRITE | A | - | 0-16 | |
| LEW 88714 | 22.6 | E-6 CHONDRITE | C | A | - | .1-.6 |

****NOTES TO TABLES 1 AND 2:**

"Weathering" categories:

- A:** Minor rustiness; rust haloes on metal particles and rust stains along fractures are minor.
- B:** Moderate rustiness; large rust haloes occur on metal particles and rust stains on internal fractures are extensive.
- C:** Severe rustiness; metal particles have been mostly stained by rust throughout.
- e:** Evaporite minerals visible to the naked eye.

"Fracturing" categories:

- A:** Minor cracks; few or no cracks are conspicuous to the naked eye and no cracks penetrate the entire specimen.
- B:** Moderate cracks; several cracks extend across exterior surfaces and the specimen can be readily broken along the cracks.
- C:** Severe cracks; specimen readily crumbles along cracks that are both extensive and abundant.

Tentative Pairings for New Specimens

Table 3 summarizes possible pairings of the new specimens with each other and with previously classified specimens, based on descriptive data in this newsletter issue. Readers who desire a more comprehensive review of the meteorite pairings in the U.S. Antarctic collection should refer to the compilation provided by Dr. E.R.D. Scott, as published in issue 9(2) (June, 1986).

CARBONACEOUS C4:

EET 90001, 90002, 90003, 90005, 90006, 90008, 90009, 90010, 90013, 90014, 90016, 90017, 90023, 90025, 90026, 90027, 90028, 90035, 90036, 90038, 90039, 90040, 90041, 90042, 90044, 90045, 90046, 90048, 90049, 90050, 90052 with EET 87507.

E-3 CHONDRITE

LEW 87057, 87237, 87285 with LEW 87223

E-6 CHONDRITE

LEW 88714 with LEW 87119.

L-5 CHONDRITE

QUE 90201, 90202, 90205, 90206, 90207, 90208, 90209, 90210, 90211, 90212, 90213, 90214, 90215, 90216, 90217, 90218, 90219, 90221, 90224, 90225, 90226, 90227, 90229, 90230, 90231, 90232, 90233, 90234, 90235, 90236, 90237, 90238, 90239, 90240, 90241, 90242, 90243, 90244, 90245, 90246, 90247, 90248, 90249, with QUE 90201.

LL6 CHONDRITE

LEW 88564, 88586, 88606

Sample No.: ALH90407
Location: Allan Hills
Field Number: 6619
Dimensions (cm): 1 x 0.9 x 0.6
Weight (g): 0.6
Meteorite Type: C2 chondrite

Macroscopic Description: Cecilia Satterwhite

The exterior of this pea-sized meteorite is dark gray to black and contains one small patch of fusion crust. The interior is medium gray. Abundant light colored inclusions and a few small dark inclusions are visible in the coarse grained matrix.

Thin Section (.2) Description: Brian Mason

The section consists almost entirely of black matrix, with sparse chondrules and small scattered grains of olivine. Microprobe analyses show that most of the olivine is near Mg_2SiO_4 in composition, but some iron-rich grains are present, the range being Fa_{1-31} , mean Fa_9 (CV FeO is 123). The meteorite is a C2 chondrite.

Sample No.: EET90001; 90002;
 90003; 90025; 90026
Location: Elephant Moraine
Field Number: 6383; 6852; 6804; 6953;
 6432
Dimensions (cm): 3.8 x 3.8 x 2.8; 3 x 2.8 x 1.5;
 3.5 x 2.5 x 1.8; NA;
 3.5 x 2.0 x 4.5
Weight (g): 53.2; 28.0; 30.8; 45.8; 61.5
Meteorite Type: C4 chondrite

Macroscopic Description: Robbie Marlow and Cecilia Satterwhite

Some fusion crust is present on all of these meteorites, the amount varying from 10% to 95%. The fusion crust is generally thin and black. Traces to abundant amounts of evaporite deposits are present. The deposit is white on most specimens except for 90003 where it has a greenish-blue color similar to that seen on EET90004 and 007. The interior of these Elephant Moraine C4's is medium gray. Cream-colored inclusions are present as is a small amount of metal.

Thin Section (EET90001.6; 90002.5; 90003.3; 90025.2; 90026.2) Description: Brian Mason
 These sections are identical with the EET90004 group previously described (Antarctic Meteorite Newsletter, vol. 14, no. 2, 1991), and can

confidently be paired with them. Additional specimens paired on optical examination are 90005, 006, 008, 009, 010, 013, 014, 016, 017, 023, 027, 028, 035, 036, 038, 039, 040, 041, 042, 043, 044, 045, 046, 047, 048, 049, 050, 052.

In the original description of the EET90004 group they were classed as C4 chondrites and tentatively paired with the EET 87507 group. Recently Kallemeyn et al. (Geochimica et Cosmochimica Acta, vol. 55, p. 883, 1991) reassigned EET87507 and its paired specimens from type 4 to type 5 "on the basis of their coarse silicate groundmass (50-200 μm) and highly recrystallized, barely discernable chondrules." However, well-defined chondrules are present in the following sections: EET87507.5; 87526.8; 90002.5; 90004.4; 90015.6; 90018.3; 90022.4. In fact, these sections are very similar to those of Karoonda, which is generally accepted as a C4 chondrite. Under these circumstances the original classification of these meteorites as C4 chondrites is retained.

Sample No.: EET90019
Location: Elephant Moraine
Field Number: 6872
Dimensions (cm): 4 x 2 x 1
Weight (g): 21.5
Meteorite Type: Ureilite

Macroscopic Description: Cecilia Satterwhite

Dull, black fusion crust covers most of this achondrite. The thickness of the fusion crust varies from thick to thin. Breaking EET90019 revealed a crystalline interior that is red-brown to black in color. Some rusty areas are present. Evaporite deposit is visible on the interior surfaces. Some troilite was noted.

Thin Section (.2) Description: Brian Mason

The section shows an aggregate of anhedral to subhedral olivine and pyroxene grains, up to 3 mm across, in a black carbonaceous matrix. The pyroxene shows coarse polysynthetic twinning. Microprobe analyses give the following compositions: olivine, Fa_{11} (CaO content is 0.3%); pyroxene, $Wo_{10}Fs_{10}$. The meteorite is a ureilite; it appears to be distinct from the other EET ureilites.

Sample No.: EET90021
Location: Elephant Moraine
Field Number: 6351
Dimensions (cm): 3.2 x 3 x 1
Weight (g): 19.6
Meteorite Type: C2 chondrite

Macroscopic Description: Cecilia Satterwhite

Seventy percent of the exterior of this carbonaceous chondrite is covered with fractured, black fusion crust. Cleaving this stone revealed an interior that is black in color and contains abundant light gray inclusions that are as large as 2 mm in diameter. A weathering rind is present.

Thin Section (.2) Description: Brian Mason

The section consists largely of black opaque matrix, with occasional chondrules up to 0.3 mm across and numerous small grains of olivine and a little pyroxene. Microprobe analyses show that most of the olivine is close to Mg_2SiO_4 in composition, with a few more iron-rich grains; mean composition is Fa_3 , with range Fa_{1-28} (CV FeO is 241). Pyroxene composition is Fs_{1-3} . The meteorite is a C2 chondrite.

Sample No.: EET90043
Location: Elephant Moraine
Field Number: 7133
Dimensions (cm): 2.9 x 1.8 x 1.3
Weight (g): 12.5
Meteorite Type: C2 chondrite

Macroscopic Description: Cecilia Satterwhite

One patch of fusion crust remains on this meteorite. The interior is black with abundant chondrules/inclusions present.

Thin Section (.2) Description: Brian Mason

The section shows numerous small chondrules, up to 0.9 mm across, and abundant small grains, mainly olivine, in a black matrix. Microprobe analyses show olivine with a wide range in composition, Fa_{1-49} , mean Fa_{14} (CV FeO is 103); pyroxene, Fs_{1-9} . The meteorite is a C2 chondrite.

Sample No.: EET90047
Location: Elephant Moraine
Field Number: 6854
Dimensions (cm): 1.7 x 1 x 0.5
Weight (g): 1.2
Meteorite Type: C2 chondrite

Macroscopic Description: Cecilia Satterwhite

What little fusion crust remains on this carbonaceous chondrite is frothy and black. A few chondrules/inclusions are visible in the black interior.

Thin Section (.2) Description: Brian Mason

The section shows numerous chondrules, up to 0.8 mm across, and some scattered silicate grains, mainly olivine, in a black matrix. The chondrules appear to be completely serpentinized. The olivine grains in the matrix are close to Mg_2SiO_4 in composition, with a few more iron-rich grains; the composition range is Fa_{1-11} , mean Fa_2 (CV FeO is 172). The meteorite is a C2 chondrite.

Sample No.: LEW87057; 87237;
87285
Location: Lewis Cliff
Field Number: 4051; 4794; 4791
Dimensions (cm): 1 x 0.5 x 0.4; 1.8 x 1.2 x 0.4;
1 x 0.5 x 0.4
Weight (g): 0.4; 1.9; 0.5
Meteorite Type: E3 chondrite

Macroscopic Description: Cecilia Satterwhite and Carol Schwarz

Little fusion crust remains on these three chondrites. Weathering has taken its toll and left their interiors severely oxidized with no features recognizable. All the material from LEW87285 was made into thin sections; potted material is still available from 87057.

Thin Section (LEW87057.1; 87237.2; 87285.1) Description: Brian Mason

These three meteorites are identical and can be confidently paired with LEW87223. The sections show a closely packed aggregate of chondrules, up to 1.2 mm across, together with abundant metal grains and minor sulfide. Weathering is extensive, with limonitic staining and areas of brown limonite throughout the sections. The chondrules consist of granular or radiating pyroxene. Most of the pyroxene is close to $MgSiO_3$ in composition, but a few more Fe-rich grains were analysed. One grain of almost pure forsterite (FeO 0.3%) was found in 87057. The metal has a variable Si content, up to 0.6%. The meteorites are classified as E3 chondrites.

Sample No.: LEW87064
Location: Lewis Cliff
Field Number: 4148
Dimensions (cm): 2 x 1.5 x 1.5
Weight (g): 6.7
Meteorite Type: H3 chondrite

Macroscopic Description: Carol Schwarz

LEW87064 is a rounded stone with a smooth surface. Ninety five percent of the exterior is covered with fusion crust. Although the interior is extensively weathered, several millimeter-sized chondrules are visible.

Thin Section (.2) Description: Brian Mason

The section shows a close-packed aggregate of chondrules and chondrule fragments, up to 1.8 mm across, in a granular matrix containing a moderate amount of nickel-iron and troilite. A variety of chondrule types is present, including granular and porphyritic olivine and olivine-pyroxene, and radiating and cryptocrystalline pyroxene. Weathering is extensive, with limonitic staining and areas of red-brown limonite throughout the section. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa₂₋₂₀, mean Fa₁₄ (CV FeO is 43); pyroxene, Fs₃₋₂₁. The amount of nickel-iron suggests H group, and the variability of olivine and pyroxene compositions type 3, hence the meteorite is classified as an H3 chondrite (estimated H3.5).

Sample No.: LEW87093
Location: Lewis Cliff
Field Number: 4206
Dimensions (cm): 2.5 x 1.5 x 1
Weight (g): 7.0
Meteorite Type: L3 chondrite

Macroscopic Description: Cecilia Satterwhite

LEW87093 is extremely weathered. Some reddish-brown crust remains and no features can be seen through the reddish brown oxidation.

Thin Section (.2) Description: Brian Mason

The section shows a close-packed aggregate of chondrules and chondrule fragments, up to 2.1 mm across, in a matrix of fine-grained olivine and pyroxene and a little nickel-iron and troilite. Weathering is extensive, with limonitic staining and areas of brown limonite throughout the section.

Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa₁₁₋₂₁, mean Fa₁₇ (CV FeO is 19); pyroxene, Fs₄₋₃₀. The variability of olivine and pyroxene compositions suggests type 3, and the amount of nickel-iron indicates L group, hence the meteorite is classified as an L3 chondrite (estimated L3.8).

Sample No.: LEW88500
Location: Lewis Cliff
Field Number: 5224
Dimensions (cm): 4.1 x 1.4 x 1.6
Weight (g): 16.0
Meteorite Type: H3 chondrite

Macroscopic Description: Robbie Marlow

LEW88500 is mostly covered with shiny brown fusion crust. The interior is severely weathered masking any features that may be present.

Thin Section (.2) Description: Brian Mason

The section shows abundant chondrules and chondrule fragments, up to 1.9 mm across, in a finely granular matrix of olivine and pyroxene with a moderate amount of nickel-iron and a little troilite. Weathering is extensive, with limonitic staining and areas of brown limonite throughout the section. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa₁₋₂₀, mean Fa₁₆ (CV FeO is 29); pyroxene, Fs₇₋₁₈. The variability of olivine and pyroxene compositions indicates type 3, and the amount of nickel-iron H group, hence the meteorite is classified as an H3 chondrite (estimated H3.7).

Sample No.: LEW88564; 88586;
88606
Location: Lewis Cliff
Field Number: 4531; 5308; 5565
Dimensions (cm): 1.7 x 1.5 x 1; 1.9 x 1.4 x 1.0;
1.4 x 1.2 x 1.0
Weight (g): 6.5; 6.4; 2.7
Meteorite Type: LL6 chondrite

Macroscopic Description: Cecilia Satterwhite and Robbie Marlow

Thin black to brown fusion crust covers approximately half of each of these specimens. Each meteorite shows a brecciated interior with dark matrix surrounding areas of light matrix. Oxidation is moderate to heavy in areas.

Thin Section (LEW88564.1: 88586.2: 88606.2)

Description: Brian Mason

These meteorites are very similar in texture and mineral compositions and are probably paired. The sections show a cataclastic texture, with individual clasts up to 4 mm across. Olivine is the principal mineral, with a lesser amount of pyroxene and minor plagioclase. The sections are dark gray from finely disseminated troilite, much of it as coatings on silicate grain boundaries. Trace amounts of nickel-iron are present. The silicates are generally fine-grained, 0.02-0.05 mm, apparently by shock comminution of larger grains. Vague traces of chondritic structure were noted. The larger clasts, most abundant in 88586, are coarser-grained and lack the disseminated sulfide. Mineral compositions are slightly variable, the means being: olivine, Fa₃₀; pyroxene, Fs₂₄; plagioclase, An₁₀. The meteorites are tentatively identified as LL6 chondrites, but further research is indicated.

Sample No.: LEW88621
Location: Lewis Cliff
Field Number: 5519
Dimensions (cm): 2.0 x 1.8 x 1.1
Weight (g): 7.5
Meteorite Type: L3 chondrite

Macroscopic Description: Robbie Marlow

Dull, frothy fusion crust covers 95% of this weathered meteorite. Any features present have been obliterated by oxidation.

Thin Section (.2) Description: Brian Mason

The section shows a close-packed aggregate of chondrules and chondrule fragments, up to 1.8 mm across, in a fine-grained matrix of olivine and pyroxene with a small amount of nickel-iron and troilite. Extensive weathering is indicated by brown limonitic staining throughout the section.

Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa₇₋₂₀, mean Fa₁₆ (CV FeO is 24); pyroxene, Fs₃₋₂₅. The variability of olivine and pyroxene compositions indicates type 3, and the amount of nickel-iron L group, hence the meteorite is classified as an L3 chondrite (estimated L3.7).

Sample No.: LEW88663
Location: Lewis Cliff
Field Number: 6116
Dimensions (cm): 2.6 x 1.8 x 1.7
Weight (g): 14.5
Meteorite Type: Achondrite (?)

Macroscopic Description: Robbie Marlow

Smooth, dull, dark brown fusion crust completely covers LEW88663. Cleaving this meteorite revealed an interior that is brown and black with a crystalline texture. A weathering rind that is about 1-2 mm thick is present. Oxidation is moderate to heavy in areas. No notable interior features were visible.

Thin Section (.2) Description: Brian Mason

The section shows a granular aggregate of subequal amounts of olivine and pyroxene (average grain size 0.3 mm), with about 10% of plagioclase, 5% of troilite, and a trace of chromite. Brown limonitic staining pervades the section. Microprobe analyses give the following compositions: olivine, Fa₂₄; pyroxene, Wo₂Fs₂₀; plagioclase, somewhat variable, An₁₇₋₂₃. The olivine and pyroxene compositions match those of an L chondrite, but chondritic structure is absent and the meteorite has no nickel-iron. The meteorite is tentatively classified as an achondrite, but the composition does not seem to match that of any known achondrite.

Sample No: LEW88679
Location: Lewis Cliff
Field Number : 6187
Dimensions (cm): 1.8 x 1.5 x 1.2
Weight (g): 7.9
Meteorite Type: Diogenite

Macroscopic Description: Cecilia Satterwhite

Thin shiny fusion crust covers most of LEW88679. Areas of light brown oxidation scattered throughout the gray matrix give the interior a mottled appearance. Single crystals of pyroxene were noted.

Thin Section (.2) Description: Brian Mason

The section consists almost entirely of anhedral grains of pyroxene, up to 6 mm across; under crossed polars they show undulose extinction. Accessory amounts of isotropic plagioclase (maskelynite?) are present, as rounded grains 0.1-0.6 mm across; one grain of olivine was seen. Microprobe analyses show that the pyroxene has a fairly uniform composition, mean Wo_3Fs_{26} , with CaO 1.4-2.0%, Al_2O_3 0.9-1.1%. Plagioclase composition is An_{92} ; olivine composition is Fa_{30} . The meteorite is a diogenite. It lacks the cataclastic texture of the other LEW diogenites (88008 and 88011).

Sample No.: LEW88696
Location: Lewis Cliff
Field Number: 6144
Dimensions (cm): 2.1 x 1.8 x 1.0
Weight (g): 6.0
Meteorite Type: L3 chondrite

Macroscopic Description: Robbie Marlow

Ninety percent of LEW88696 is covered with smooth brown fusion crust. Abundant millimeter-sized inclusions are visible in the gray matrix. Oxidation appears as large patches scattered throughout the interior.

Thin Section (.2) Description: Brian Mason

The section shows numerous chondrules and chondrule fragments, up to 2.4 mm across, in a groundmass of fine-grained olivine and pyroxene with a minor amount of nickel-iron and troilite. Weathering is extensive, with limonitic staining and small areas of red-brown limonite throughout the section. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{5-19} , mean Fa_{16} (CV FeO is 28); pyroxene, Fs_{6-19} . The variability of olivine and pyroxene compositions indicates type 3, and the amount of nickel-iron L group, hence the meteorite is classified as an L3 chondrite (estimated L3.7).

Sample No.: LEW88714
Location: Lewis Cliff
Field Number: 5654
Dimensions (cm): 3.5 x 3.5 x 1
Weight (g): 22.6
Meteorite Type: E6 chondrite

Macroscopic Description: Cecilia Satterwhite

Smooth, shiny, brown fusion crust covers one half of this meteorite. The interior matrix is fine-grained. Oxidation is heavy, giving the interior a brown color.

Thin Section (.2) Description: Brian Mason

Only vague traces of chondritic structure can be distinguished; the section consists largely of fine-grained pyroxene (grain size 0.06-0.3 mm), with a moderate amount of nickel-iron and minor troilite. Trace amounts of a colorless highly birefringent mineral, probably sinoite, were noted. Weathering is extensive, with brown limonitic staining throughout the section. Microprobe analyses show the pyroxene is almost pure $MgSiO_3$ (FeO 0.1-0.4%, CaO 0.5-0.6%); a little plagioclase, An_{13} , was found. The nickel-iron contains about 1.5% Si. The meteorite is an E6 chondrite; it is closely similar to LEW87119 and LEW88135, with which it may be paired. The other LEW E6 chondrite, 88180, is distinctly different, and almost unweathered.

Sample No.: LEW88758
Location: Lewis Cliff
Field Number: 5620
Dimensions (cm): 2.1 x 1.5 x 0.9
Weight (g): 5.0
Meteorite Type: LL3 chondrite

Macroscopic Description: Robbie Marlow

Shiny, dark brown fusion crust covers nearly half the exterior of this extremely weathered meteorite. The interior consists of dark brown matrix with some orangish colored inclusions/chondrules.

Thin Section (.2) Description: Brian Mason

The section shows abundant chondrules and chondrule fragments, up to 1.7 mm across, in a fine-grained dark matrix which contains trace amounts of nickel-iron and troilite. Weathering is extensive, with brown limonitic staining throughout the section. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{2-32} , mean Fa_{16} (CV FeO is 57); pyroxene, Fs_{2-27} . The variability of olivine and pyroxene compositions indicates type 3, and the amount of nickel-iron LL group, hence the meteorite is classified as an LL3 chondrite (estimated LL 3.4).

Sample No.: LEW88783
Location: Lewis Cliff
Field Number: 5372
Dimensions (cm): 2.5 x 2.0 x 1.5
Weight (g): 9.8
Meteorite Type: LL3 chondrite

Macroscopic Description: Robbie Marlow

No fusion crust remains on this weathered stone. Evaporite deposit is present on the exterior surface. The interior is red brown with small areas of gray matrix scattered throughout. One millimeter sized orange inclusion was noted. Oxidation is heavy.

Thin Section (.2) Description: Brian Mason

The section shows a close-packed aggregate of chondrules and chondrule fragments, up to 2.9 mm across, in a minimum amount of black opaque matrix which contains accessory amounts of nickel-iron and troilite. Minor weathering is indicated by scattered areas of brown limonite. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa₇₋₃₄, mean Fa₁₈ (CV FeO is 38); pyroxene, Fs₁₋₁₈. The variability of olivine and pyroxene compositions indicates type 3, and the amount of nickel-iron LL group, hence the meteorite is classified as an LL chondrite (estimated LL3.6).

Sample No.: WIS90302
Location: Wisconsin Range
Field Number: 6117
Dimensions (cm): 19.8 x 14.5 x 12.5
Weight (g): 3864.6
Meteorite Type: H5 chondrite

Macroscopic Description: Roberta Score and Robbie Marlow

The exterior surface of WIS90302 is approximately 30% covered with dull brown and black fusion crust. Areas devoid of fusion crust are a dull brown rusty color. Abundant 2-3 mm sized chondrules and large rectangular (10 x 10 mm) clasts are scattered over the rough exterior surface. Minor fractures are present.

In hand specimen WIS90302 appears to be brecciated. Many large (several cm in size) white areas are completely surrounded by dark areas. Metal is scattered throughout. Weathering is moderate to heavy. This meteorite plus the other three chondrites found in the Wisconsin Range were collected by a geologic field team working in the area.

Thin Section (.11.12.13) Description: Brian Mason

The sections show a few chondrules and chondrule fragments in a crystalline groundmass consisting largely of olivine and pyroxene with minor nickel-iron and troilite. Moderate weathering is indicated by limonitic staining around metal grains. The brecciated structure noted in the macroscopic description is not particularly evident in thin sections, being manifested in areas darkened by the presence of finely divided troilite, probably a shock effect. The texture and mineral compositions classify this meteorite as an H5 chondrite, although an area in 90302,11 had no chondrules and an H6 texture.

TABLE 4

Natural Thermoluminescence (NTL) Data for Antarctic Meteorites

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Cosmochemistry Group
Dept. of Chemistry and Biochemistry
University of Arkansas
Fayetteville, AR 72701

The measurement and data reduction methods were described by Hasan et al. (1987, Proc. 17th LPSC E703-E709; 1989, LPSC XX, 383-384). For meteorites whose NTL lies between 5 and 100 krad, the natural TL is related primarily to terrestrial age. Samples with NTL <5 krad have TL below that which can reasonably be ascribed to long terrestrial ages. Such meteorites have had their TL lowered by heating within the past million years or so (by close solar passage, shock heating, or atmospheric entry), exacerbated, in the case of certain achondrite classes, by "anomalous fading". We suggest that meteorites with NTL > 100 krad are candidates for an unusual history involving high radiation doses and/or low temperatures. NTL data for 40 Allan Hills meteorites collected by EUROMET in 1988 have been published in Meteoritical Bulletin 71 (Meteoritics 26:3). (February 1992 data set).

| Sample | Class | NTL [krad at 250 deg. C] | Sample | Class | NTL [krad at 250 deg. C] |
|----------|-------|--------------------------------|----------|-------|--------------------------------|
| EET90020 | EUC | 1.4 ± 0.1 | EET90012 | L 4 | 11.6 ± 0.1 |
| LEW90500 | C 1 | < 1 | QUE90201 | L 5 | 8.0 ± 0.1 |
| EET90007 | C 4 | 2 ± 1.5 | QUE90202 | L 5 | 8.2 ± 0.1 |
| EET90015 | C 4 | < 1 | EET90030 | L 6 | 12.6 ± 0.1 |
| | | | EET90034 | L 6 | 4 ± 1 |
| EET90031 | LL6 | 26.1 ± 0.1 | QUE90200 | H 4 | 88.5 ± 0.9 |
| ALH90411 | L 3 | 20.5 ± 0.1 | QUE90203 | H 6 | 42.9 ± 0.2 |

The quoted uncertainties are the standard deviations shown by replicate measurements of a single aliquot.

COMMENTS: The following comments are based on natural TL data, TL sensitivity, the shape of the induced TL glow curve, classifications and JSC and Arkansas group sample descriptions.

EET90034 appears to have been heavily shocked.

ALH90411 is type 3.7.

Pairings (confirmation of pairings suggested in AMN 14:2):

C4: EET90007, EET90015 with EET87507

L5: QUE90201 and QUE90202 (reclassified from L4 in this issue).

TABLE 5

²⁶Al Activity Data for Antarctic Meteorites

John F. Wacker
 Battelle, Pacific Northwest Laboratories
 P.O. Box 999, Mailstop P7-07
 Richland, Washington 99352

| SPECIMEN NUMBER | CLASS | ²⁶ Al Activity (dpm/kg) | SPECIMEN NUMBER | CLASS | ²⁶ Al Activity (dpm/kg) |
|--------------------|-------|---------------------------------------|--------------------|-------|---------------------------------------|
| ALHA 81096 | H5 | 55 ±5 | TIL 82406 | L4 | 58 ±4 |
| ALHA 81097 | H4 | 60 ±5 | TIL 82407 | L4 | 48 ±3 |
| ALHA 81304 | L6 | 40 ±2 | TIL 82408 | LL3 | 49 ±4 |
| ALHA 81307 | L6 | 51 ±3 | TIL 82409 | H5 | 46 ±3 |
| ALHA 82110 | H3 | 53 ±3 | TIL 82411 | L4 | 49 ±3 |
| ALHA 84099 | H5 | 68 ±4 | TYR 82700 | L4 | 60 ±4 |

Uncertainties are calculated from counting statistics. All data have been corrected for background effects and counting geometry, and preliminary corrections have been made for sample geometry effects. For more information or to request a copy of the complete Battelle ²⁶Al dataset, please contact John Wacker [telephone: (509) 376-1076; FAX: (509) 376-5021].